AK

Notice of Allowability	Application No.	Applicant(s)	
	10/790,194	BELKE ET AL.	
	Examiner	Art Unit	
	Cindy D. Khuu	2863	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *10/26/04*.

2. ☒ The allowed claim(s) is/are *15-30 and 37-42*.

3. ☐ The drawings filed on _____ are accepted by the Examiner.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☒ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☒ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date 03/02/05, 10/26/04
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DETAILED ACTION

Election/Restrictions

This application contains claims directed to the following patentably distinct species of the claimed invention:

I. Claims 1-14 and 31-36, drawn to apparatus and method using an orifice meter.

II. Claims 15-30 and 37-42, drawn to an apparatus and method using a turbine meter.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, there are no generic claims.

During a telephone conversation with Donald Tomkins on August 15, 2005 a provisional election was made without traverse to prosecute the invention of II, claims 15-30 and 37-42. Affirmation of this election must be made by applicant in replying to this Office action. Claims 1-14 and 31-36 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

This application is in condition for allowance except for the presence of claims 1-14 and 31-36 are non-elected without traverse. Accordingly, claims 1-14 and 31-36 have been cancelled.

Examiner's Amendment

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Donald Tomkins on August 17, 2005.

The application has been amended as follows:

New Figure:

Insert new FIG. 2A (See attached proposed drawing).

New paragraph:

Page 10, Line 9. Insert the following paragraph:

FIGURE 2A is a block diagram of the computer of an electronic gas flow measurement device in accordance with an embodiment of the invention.

Amended paragraphs:

Page 11, line 23. Replace the current paragraph with the following paragraph:

FIG. 2 illustrates an electronic flow measurement and recording device ("EFM") 10 in accordance with the present invention, for use with a turbine flow meter. **FIG. 2A is a block diagram of the EFM 10 and components thereof as will be described herein.** The EFM 10 has a housing 12 which in the preferred embodiment will be an explosion-proof housing. The housing 12 has a turbine connection port 14, for

connecting the device 10 to the sensing element riser 42 of a turbine flow meter 30 mounted in a gas pipeline 50, as schematically illustrated in FIG. 3. The housing 12 also has a pressure sensor port 16 for connection to a pressure sensor (or transducer) which senses gas pressure in the pipeline 50 at a point upstream of the turbine meter 30, as shown in FIG. 3. As well, the housing 12 has a temperature sensor port 18 for connection to a temperature sensor (or transducer), typically a resistive temperature device (or RTD) which senses gas temperature at a point downstream of the turbine meter 30, as shown in FIG. 3.

Page 12, line 8. Replace the current paragraph with the following paragraph:

~~Enclosed within the~~ **As illustrated in FIG. 2A**, housing 12 of the EFM 10 ~~is~~ **encloses** a computer **11** having a microprocessor ~~(not shown)~~ **11A** and a read-only memory (ROM) **11B**, with data input means 13 for entering data in the ROM. The EFM 10 also includes computer connection means for connecting the EFM 10 with an external computer for purposes of programming the microprocessor **11A** and thus "configuring" the EFM 10 in accordance with protocols described later herein. The computer connection means may be a serial port 20 as shown in FIG. 2 **and FIG. 2A**. The computer connection means may be used as the data input means **13**, in conjunction with an external computer. However, in the preferred embodiment the data input means is a portable, readable and writable data storage means, which may be an MMC card (multi-media card), SD card (secure data card), or other portable memory means. Accordingly, in the preferred embodiment the EFM 10 has means for reading and writing data from or to a portable data storage means. In the particularly preferred embodiment illustrated in FIG. 2, the EFM 10 has an MMC card slot 22 for receiving an MMC card to be read by an MMC card reader/writer (not shown) disposed inside the housing 12. This feature can also be adapted for use as the means for programming the microprocessor.

Page 12, line 22. Replace the current paragraph with the following paragraph:

The EFM 10 also has data output means **15** for retrieving data stored in the ROM **11B**. As shown in FIG. 2, the data output means **15** will include a display screen 24 mounted in a face plate 23 that provides a digital display of current or historical gas flow data stored in the ROM **11B**. The screen 24 is preferably protected by a transparent face plate cover 25 made of glass or plastic. The EFM 10 features an internal button 26 for activating the display of gas flow data. The internal button 26 is accessible only upon removal

of the face plate cover 25. An external display button 28 is also provided for activating the display of gas flow data, and for additional functions as described later herein.

Page 13, line 1. Replace the current paragraph with the following paragraph:

As previously indicated, the preferred embodiment of the EFM 10 includes an MMC card reader/writer, which permits the use of an MMC card as an additional and particularly convenient data output means **15**, as will be described herein.

Page 13, line 4. Replace the current paragraph with the following paragraph:

It will be readily appreciated by persons skilled in the art that the display screen 24 may be configured in a variety of ways, for selective display of different gas flow parameters. By way of example, the display screen 24 in FIG. 2 is adapted to display, in appropriately ~~labelled~~ **labeled** screen sectors, parameters including gas pressure (gauge or absolute), gas flow sampling frequency, gas flow measurements and corresponding units (e.g., thousands of cubic feet or thousands of cubic meters per hour or per day), and total daily gas flows (with corresponding dates). In the preferred embodiment, the ROM **11B** of the EFM 10 has capacity to store daily gas flows for at least 40 days, thus greatly reducing the frequency with which a technician needs to gather data from the unit. The EFM 10 is adapted such that a technician can use either the internal button 26 or the external button 28 toggle through all of the daily flow records stored in the ROM **11B**, thus displaying each day's total on the screen 24 for review and/or transcription by the technician as desired.

Page 13, line 16. Replace the current paragraph with the following paragraph:

In the preferred embodiment, however, the collection of historical daily gas flows is most efficiently accomplished by removing the face plate cover 25 and inserting an MMC card into the MMC slot 22. The EFM 10 may be configured in "always on" mode, in which case all data in the ROM **11B** will be automatically downloaded onto the MMC card. Alternatively, the EFM 10 may be configured so as to require depression of the external button 28 to signal the MMC card reader/writer to download the data from the ROM **11B** onto the MMC card. In either case, the EFM 10 is configured so as to display a message such as "Card Busy" on the display screen 24 while downloading is in progress, and then a message such as "Card Done" to indicate that downloading is complete and that the MMC card may be

extracted from the MMC card slot 22.

Page 13, line 25. Replace the current paragraph with the following paragraph:

In alternative embodiments, the data output means **15** may include a hard-wired or wireless communications link to a computer distant from the EFM 10. In other embodiments, the data may be downloaded from the ROM **11B** of the EFM 10 to an external computer connected to the EFM 10 via the serial port 20 or other computer connection means.

Page 15, line 24. Replace the current paragraph with the following paragraph:

FIG. 4 schematically depicts the programming steps for loading software onto the computer **11** of a turbine meter embodiment of the EFM. These programming steps are carried out on a separate programming computer temporarily connected to the EFM via the computer connection means (serial port 20 in the preferred embodiment, as previously described), using appropriate USB or serial cable and serial interface box. The programming computer may be a desktop computer, or a portable computer such as a laptop. The EFM, also referred to as the DCR (for "digital chart recorder") head unit, will typically be programmed prior to field installation, to suit the characteristics (e.g., "K" factors) of the turbine meter to which it will be fitted, and to suit the known or anticipated characteristics of the gas flowing in the pipeline in which the meter will be mounted. However, the EFM may also be reprogrammed in the field to suit changed operating parameters (for example, gas composition, or new "K" factors when a turbine meter is being replaced), and the use of a portable computer for the programming computer is particularly advantageous in such situations.

Page 16, line 19. Replace the current paragraph with the following paragraph:

The next screen will be a "Surface Box Setup" screen generally as shown in FIG. 4B ("surface box" being an alternative reference for the EFM's computer **11**). The Surface Box Setup screen allows the user to configure the EFM in "Always On" mode, in which case it will continuously display flow data, or in "Always Off" or "User Turn On" mode, in either of which cases the EFM will need to be manually turned on in order to display flow data. These latter two modes are preferable to the "Always On" mode in order to minimize power consumption. The user may also select how long data remains displayed after the EFM is turned on. Other variables and options that may be entered or selected on the Surface Box Setup screen include

password protection (on or off), pressure display units (kiloPascals or pounds per square inch; gauge or absolute), temperature display units (Celsius or Fahrenheit), and gas flow measurement units (thousands of cubic meters, or thousands of cubic feet, per unit time). In preferred embodiments, the user will also be able to select whether the EFM is to be configured for use with a turbine meter or an orifice meter.

Page 18, line 9. Replace the current paragraph with the following paragraph:

The field operation of the EFM may be best understood by reference to FIG. 5, which schematically depicts the main operating loop of the microprocessor **11A** of the EFM 10 in accordance with a preferred embodiment. As indicated, the main operating loop comprises a number of routines, which the microprocessor **11A** runs sequentially at selected sampling intervals (in accordance with the configuration of the EFM). Upon initiation of pressure routine 310 (FIG. 5A) with a request (step 311) from the main loop, the EFM 10 obtains a current analog gas pressure reading from the pressure transducer (step 312). This pressure reading is first checked to confirm that it is within the pre-determined operating range of the pressure transducer. Then the pressure reading is corrected as may be necessary by comparing it against a pressure calibration table stored in the ROM **11B** of the EFM 10. The pressure calibration table corresponds to the specific pressure transducer being used with the EFM 10, and facilitates correction for any inherent tendencies for "drift" of pressure readings across the pressure transducer's operating range. Next, a current gas temperature reading is obtained from the temperature transducer (step 313). The EFM 10 then uses these pressure and temperature readings in known polynomial equations to determine a temperature-compensated pressure value (step 314). The temperature-compensated pressure value is then returned to the main loop (step 315).

Page 18, line 25. Replace the current paragraph with the following paragraph:

The microprocessor then initiates temperature routine 320 (FIG. 5B) upon receipt of a request (step 321) from the main loop. At step 322, a current analog temperature reading is obtained from the temperature transducer, and this reading is checked to confirm that it is within the pre-determined operating range of the temperature transducer. Then the temperature reading is corrected as may be necessary by comparing it against a temperature calibration table stored in the ROM **11B** of the EFM 10. The temperature calibration table corresponds to the specific temperature transducer being used with the EFM 10, and facilitates correction for any inherent tendencies for "drift" of temperature readings across the temperature

transducer's operating range. The corrected temperature reading is then returned to the main loop (step 323).

Page 19, line 4. Replace the current paragraph with the following paragraph:

In turbine routine 330 (FIG. 5C), the EFM 10 receives pulse signals from the pulse-counting sensor element 40 of the turbine meter 30 (step 331), whereupon the EFM 10 executes a test routine (step 332) to confirm that these are real pulse signals rather than signals resulting from spurious events. Upon confirmation of a valid pulse signal, the EFM 10 increments a stored global pulse count value and a global time base (step 333). A "raw" or uncorrected gas flow rate value is then determined, by comparison of the pulse count value against the K-factor look-up table stored in the ROM **11B** of the EFM 10, and the stored global gas flow value is incremented (step 334). This uncorrected value is conventionally measured in "actual" cubic feet (or cubic meters) per unit of time.

Page 19, line 13. Replace the current paragraph with the following paragraph:

In AGA-7 routine 340 (FIG. 5D), the currently stored global gas flow value is corrected for temperature and pressure in accordance with the AGA-7 standard. Upon receipt of a request from the main loop (step 341), the EFM 10 reads the current global pressure value (step 342), temperature value (step 343), and uncorrected gas flow value (step 344). These values are compared to look-up tables stored in the ROM **11B** of the EFM 10 to determine a new global gas flow value corrected for pressure and temperature in accordance with AGA-7, and this corrected value is stored in the ROM **11B (step 345)**.

Page 19, line 20. Replace the current paragraph with the following paragraph:

In AGA-8 routine 350 (FIG. 5E), the current pressure-and-temperature-corrected gas flow value is corrected for gas composition (i.e., gas density) ~~by comparing~~ **Upon receipt of a request from the main loop (step 351), the EFM 10 reads the current AGA-7 global gas flow value (step 352) and compares** it against the AGA-8 look-up table in the ROM **11B** to determine a new and fully corrected gas flow value, conventionally measured in "standard" cubic feet (or cubic meters) per unit of time (step 353). This value is stored and returned to the main loop (steps 354, 360).

Page 19, line 25. Replace the current paragraph with the following paragraph:

Display routine 370 (FIG. 5F) simply allows for selection of imperial or metric units for display or downloading of gas flow measurement data (i.e., cubic feet or cubic meters per unit of time). **Upon receipt of a request from the main loop (step 371), the EFM 10 converts gas flow data from metric to imperial units, or vice versa (step 372), and writes the converted data to a display buffer (step 373).**

Page 20, line 8. Replace the current paragraph with the following paragraph:

Button routine 390 (FIG. 5H) is initiated when it is desired to read data stored in the ROM **11B** of the EFM 10 directly from the digital display screen 24 of the EFM 10. The EFM 10 can be programmed to display a variety of stored data values, and the user can toggle through these values by repeatedly depressing either the internal display button 26 or the external display button 28 of the EFM 10. Upon sensing that either the internal display button 26 or the external display button 28 has been depressed (step 391), the EFM 10 checks a status counter to determine what data value corresponds to the display button's current "toggle" position (step 392), and writes the corresponding value to the display screen 24 (step 393).

Allowable Subject Matter

Claims 15-30 and 37-42 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: The prior art of record, taken alone or in combination, fails to disclose or render obvious:

With respect to claim 15, wherein an electronic gas flow measurement device for use with a turbine meter mounted in a gas pipeline is programmed with software for: i.1 selecting intermediate values from the look-up tables corresponding to gas temperature and pressure inputs; i.2 selecting turbine "K" factors from the look-up tables corresponding to turbine pulse count inputs; and i.3 processing the selected intermediate values and "K" factors to calculate gas flow rates adjusted for temperature, pressure, and density, in accordance with one or more selected gas flow rate calculation methods .

Morgenthale et al (5,831,176) teach an electronic gas flow measurement device for use with a turbine meter mounted in a gas pipeline, said device comprising: (a) a housing; (b) a computer having a microprocessor and a read-only memory (ROM); (c) data input means, for entering data in the ROM; (d) data output means, for retrieving data stored in the ROM (Column 5: Lines 29 and 36); (e) turbine pulse counting means, for counting pulses of the turbine in the turbine meter (Column 2: Lines 37-40); (f) means for receiving gas temperature inputs; and (g) means for receiving gas pressure inputs from upstream of the turbine meter (Column 5: Lines 24-27).

However, Morgenthale does not teach at least wherein the device is programmed with software for: i.1 selecting intermediate values from the look-up tables corresponding to gas temperature and pressure inputs; i.2 selecting turbine "K" factors from the look-up tables corresponding to turbine pulse count inputs; and i.3 processing the selected intermediate values and "K" factors to calculate gas flow rates adjusted for temperature, pressure, and density, in accordance with one or more selected gas flow rate calculation methods.

Schieber (5,866,824) teaches a gas turbine meter mounted in a gas pipeline comprising: (a) a housing; (b) a computer having a microprocessor and a read-only memory (ROM); (c) data input means, for entering data in the ROM; (d) data output means, for retrieving data stored in the ROM (Column 19: Lines 14-30); (e) turbine pulse counting means, for counting pulses of the turbine in the turbine meter (Column 7: Lines 15-24); (f) means for receiving gas temperature inputs; and (g) means for receiving gas pressure inputs from upstream of the turbine meter (Column 4: Lines 11-15);

However, Schieber does not teach at least wherein the device is programmed with software for: i.1 selecting intermediate values from the look-up tables corresponding to gas temperature and pressure inputs; i.2 selecting turbine "K" factors from the look-up tables corresponding to turbine pulse count inputs; and i.3 processing the selected intermediate values and "K" factors to calculate gas flow rates adjusted for temperature, pressure, and density, in accordance with one or more selected gas flow rate calculation methods.

With respect to claim 37, a method of calculating gas flow rates in conjunction with a turbine meter mounted in a gas pipeline, said method including the steps of: (c) using the appropriate look-up tables, determining a set of intermediate values for the selected gas flow calculation parameters, corresponding to the collected data readings; (d) determining the "K" factor for the turbine over a selected range of turbine pulse frequencies, and preparing a corresponding look-up table; and (f) using the set of intermediate values and "K" factor determined from the look-up tables as input variables, calculating a gas flow rate using one or more selected calculation methods.

Morgenthale et al (5,831,176) teach a method of calculating gas flow rates in conjunction with a turbine meter mounted in a gas pipeline, said method including the steps of: (a) calculating look-up tables comprising intermediate values for selected gas flow calculation parameters, in accordance with one or more selected calculation methods, for selected ranges of selected input variables; and (b) collecting data readings for the selected input variables for a gas flowing in the pipeline (Column 5: Lines 30-38 and 55-61).

However, Morgenthale does not teach at least the methods of (c) using the appropriate look-up tables, determining a set of intermediate values for the selected gas flow calculation parameters, corresponding to the collected data readings; (e) collecting a turbine pulse frequency reading, and determining a corresponding "K" factor from the corresponding look-up table; and (f) using the set of intermediate values and "K" factor determined from the look-up tables as input variables, calculating a gas flow rate using one or more selected calculation methods.

Johnson (4,173,891) teaches a method of calculating gas flow rates in conjunction with a turbine meter mounted in a gas pipeline, said method including the steps of: (a) calculating look-up tables comprising intermediate values for selected gas flow calculation parameters, in accordance with one or more selected calculation methods, for selected ranges of selected input variables; and (b) collecting data readings for the selected input variables for a gas flowing in the pipeline (Column 13: Lines 1-50).

However, Johnson does not teach at least the methods of (c) using the appropriate look-up tables, determining a set of intermediate values for the selected gas flow calculation parameters, corresponding to the collected data readings; (d) determining the "K" factor for the turbine over a selected range of turbine pulse frequencies, and preparing a corresponding look-up table; and (e) collecting a turbine pulse frequency reading, and determining a corresponding "K" factor from the corresponding look-up table.

Claims 16-30 and 38-42 are allowed due to their dependency on claims 15 and 37.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cindy D. Khuu whose telephone number is (571) 272-8585. The examiner can normally be reached on M-F, 8:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Barlow can be reached on (571) 272-2269. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CDK 8/18/05

MICHAEL NGHIEM
PRIMARY EXAMINER

Approved 8/19/05

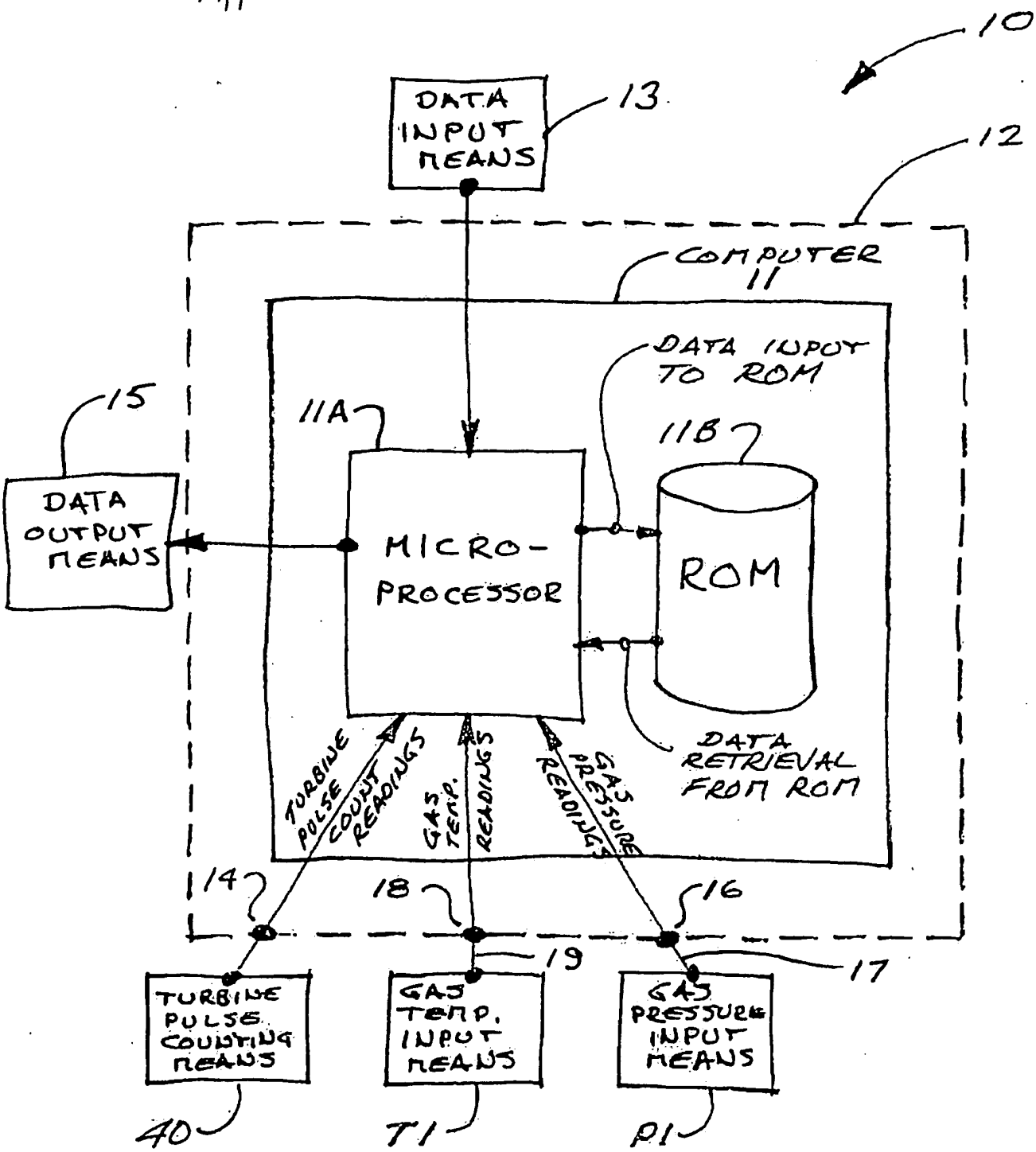

FIG. 2A (PROPOSED)

REFERENCE:

APP. No. 10/790,194

REVISED VERSION
AUG. 19/05